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ABSTRACT

This annotated bibliography presents a listing of technical reports (1976) dealing with personnel and training research conducted by the Air Force Human Resources Laboratory, an institution charged with the planning and execution of United States Air Force exploratory and advanced development programs for selection, motivation, training, retention, education, assignment, utilization, and career development of military personnel, and the composition of the personnel force and training equipment. (This laboratory also provides technical and management assistance to support studies, analyses, development planning activities, acquisition, test evaluation, modification, and operation of aerospace systems and related equipment.) The ninety-four abstract entries list the division name at the time of report publication and appear in technical report number sequence. The bibliography contains six indexes: personal author, civilian corporate author, project, title, division, and key word. (Author/BM)

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AIR FORCE HUMAN RESOURCES LABORATORY

ANNOTATED BIBLIOGRAPHY OF THE AIR FORCE HUMAN RESOURCES LABORATORY TECHNICAL REPORTS – 1976

Compiled by
Esther M. Barlow

HQ AIR FORCE HUMAN RESOURCES LABORATORY
Brooks Air Force Base, Texas 78235

January 1978

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ASUPT	CODAP	equipment	job inventories
attitude	cost analysis	evaluation	job performance aids

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This annotated bibliography presents a listing of technical reports (1976) dealing with personnel and training research conducted by the Air Force Human Resources Laboratory (AFHRL).

The research has been conducted by professional personnel representing a variety of disciplines, including psychologists, operations research specialists, mathematicians, computer analysts, economists, electronic engineers, aeronautical engineers, and technical support personnel.

AFHRL is charged with the planning and execution of USAF exploratory and advanced development programs for selection, motivation, training, retention, education, assignment, utilization, and career development of

Item 19 (*Continued*)

job satisfaction
management
manpower
occupational analysis
personnel
readability
retention
selection
simulation
surveys
systems design
training
utilization
weapon systems

Item 20 (*Continued*)

military personnel; also the composition of the personnel force and training equipment. This Laboratory also provides technical and management assistance to support studies, analyses, development planning activities, acquisition, test evaluation, modification, and operation of aerospace systems and related equipment.

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ANNOTATED BIBLIOGRAPHY OF THE AIR FORCE HUMAN RESOURCES LABORATORY TECHNICA REPORTS – 1976

INTRODUCTION

The Air Force Human Resources Laboratory (AFHRL), Brooks AFB, Texas, was established in 1968 as an Air Force Systems Command (AFSC) laboratory. (During the early part of 1968 it was part of the Aerospace Medical Division.)

This Laboratory is charged with the planning and execution of USAF exploratory and advanced development programs for selection, motivation, training, retention, education, assignment, utilization, and career development of military personnel; also the composition of the personnel force and training equipment. This Laboratory also provides technical and management assistance to support studies, analyses, development planning activities, acquisition, test evaluation, modification, and operation of aerospace systems and related equipment.

At the end of 1976, AFHRL consisted of a headquarters at Brooks AFB and six divisions geographically dispersed throughout the United States as follows:

1. Advanced Systems Division, Wright-Patterson AFB, Ohio. (This was the Training Research Division until June 1970.)

2. Computational Sciences Division, Lackland AFB, Texas. (This was part of the Personnel Research Division until August 1973.)

3. Flying Training Division, Williams AFB, Arizona. (This division was established May 1969.)

4. Occupation and Manpower Research Division, Lackland AFB, Texas. (This was part of the Personnel Research Division until August 1973, when it became the Occupational Research Division. In November 1974, this division incorporated part of the Manpower and Personnel Systems Division, which was deactivated, and was renamed the Occupational and Manpower Research Division.)

5. Personnel Research Division, Lackland AFB, Texas. (For a short time during 1970 and 1971, this division was called the Personnel Division.)

6. Technical Training Division, Lowry AFB, Colorado. (This division was established May 1969.)

Abstract entries list the division name at the time of report publication.

The abstracts appear in technical report number sequence. Entries following the author and title heading give information identifying the report and indicate where it is available:

Project number: Research areas identified by these numbers are given in the PROJECT index. The Air Force contract number and the name of the contracting organization are entered for contract-produced reports.

DDC accession number indicates availability to Government offices and registered contractors from the Defense Documentation Center; this number should be used when requesting reports from DDC.

NTIS appears only if the report has been deposited with the National Technical Information Service, Springfield, Virginia, 22151, for sale to the general public.

To obtain copies of reports without DDC accession numbers, furnish the names of authors, titles, report numbers, and dates to DDC or NTIS.

This bibliography contains six indexes: PERSONAL AUTHOR, CIVILIAN CORPORATE AUTHOR, PROJECT, TITLE, DIVISION, and KEY WORD. Reports are identified in the indexes by the serial number appearing in the left margin of the abstract entries. This report does not contain classified or For Official Use Only technical reports.

1 **Askren, W.B. Human resources as engineering design criteria. AFHRL-TR-76-1, AD-A024 676. Wright-Patterson AFB, OH: Advanced Systems Division. March 1976. Project 1124. NTIS.** Summarizes the results of a number of studies which have been performed in an attempt to develop a technology for using human resources data as criteria in engineering design studies. Eight investigations conducted during the period 1966–1975 are briefly described. The results of the eight studies are integrated around six topics of: feasibility and practicality of using human resources data as criteria in engineering design, methods for using the data in design studies, effect on the system of using the data as design criteria, types of human resources data most relevant for use as design criteria, methods for generating human resouces data for use in design studies, and nature of the engineering design process. (12 pp.)

2 **Beusse, W.E. Attitudes of military officers toward promotion. AFHRL-TR-76-2, AD-A036 108. Lackland AFB, TX: Personnel Research Division, February 1976. Project 4499. NTIS.** This study provides data on the attitudes of military officers towards the promotion system in their respective service. The data were collected in the 1973 DoD personnel survey under the sponsorship of the Office of the Assistant Secretary of Defense (Manpower and Reserve Affairs). More than 20,000 responses were obtained from a stratified random sample of officers weighted to represent the total population. This survey collected information on officers' attitudes toward the promotion system, satisfaction with its operation, perception of equity with civilian promotions, opinions about below-the-zone promotion, the meaning of promotion to the individual, factors which are important in promotions, and expected terminal rank. More officers were dissatisfied with the promotion system than were satisfied although 60 percent were satisfied with promotion information. Almost half thought that military promotions were slower than civilian ones. More than three-quarters of the officers felt that below-the-zone promotions had a good effect. Promotions meant more responsibility and more satisfaction to most officers. Ability was cited as the factor which should be most important in promotion. Finally, more than half expected to retire at pay grade 0–6 or higher. (28 pp.)

3 **Christal, R.E., & Weissmuller, J.J. New CODAP programs for analyzing task factor information. AFHRL-TR-76-3, AD-A026 121. Lackland AFB, TX: Occupational and Manpower Research Division, May 1976. Project 7734. NTIS.** The Comprehensive Occupational Data Analysis Programs (CODAP) package is a highly interactive and efficient system of computer routines for analyzing, organizing, and reporting occupational information. Until recently, CODAP contained approximately thirty-five main programs for analyzing data collected with job inventories to produce task-level descriptions of the work performed by individuals and groups of individuals. It also contained programs for identifying and describing the types of jobs existing in an occupational category, and for describing the characteristics of individuals falling into special or job-type groups. The new programs described in this paper represent a major addition to the CODAP system, filling an important gap by equipping the analyst with tools for addressing new problem areas. In addition to describing the eight new programs in detail and showing how they interact with existing programs, the paper provides an example demonstrating how the new programs can be used to develop and apply an equation which assigns training priorities to tasks in an occupational area based upon consideration of relevant task factor information. (16 pp.)

4 **Smith, J.F., & Matheny, W.G. Continuation versus recurrent pilot training. AFHRL-TR-76-4, AD-A025 846. Williams AFB, AZ: Flying Training Division, May 1976. Project 1123. NTIS.** This report provides a brief survey of literature on retention of motor, procedural and communication skills judged relevant to pilot training. Also included are data concerning more recent pilot recurrent training information available from the United States Air Force, the United States Army and the Federal Aviation Agency. Implications of these data for USAF continuation pilot training are discussed and an approach to obtaining more specific information is recommended. (16 pp.)

5 **Alley, W.E. Effect of Air Force recruiting incentives on volunteer e.. .ment. AFHRL-TR-76-5. AD-A025 852. Lackland AFB, TX: Personnel Research Division, May 1976. Project 7719. NTIS.** Recent changes in U.S. selective service laws have brought the Armed Services into increasing competition with other large organizations to obtain sufficient numbers of qualified entry-level personnel. As a result, much greater emphasis has been placed on developing enlistment incentives to meet national and regional recruiting objectives. The purpose of this study was to examine the way various aspects of the Air Force are viewed by in-coming recruits and to determine how these perceptions were related to volunteer enlistment decisions. Attitude surveys were administered to two random samples of Air Force servicemen entering during FY 71 (N = 8,007) and FY 72 (N = 9,331). Respondents were asked to rate each of several aspects of the service (i.e., expected job interest, equitable pay, working conditions) according to its perceived importance and obtainability. They were also asked to indicate (a) their state of residence prior to entry into service, and (b) the likelihood they would have enlisted in the absence of the draft. Responses to the survey were analyzed using multi-way distributions and correlational techniques. Comparisons were made between the two samples across time and within samples, between groups categorized according to volunteer intent. Finally, regional variations in perceptions of the service were investigated. Implications of findings for establishing recruiting incentives were discussed. (24 pp.)

6 **Gould, R.B., & Christal, R.E. VARSEL: Variable selection for multiple-purpose prediction systems in the absence of external criteria. AFHRL-TR-76-6, AD-A025 328. Lackland AFB, TX: Occupational and Manpower Research Division, May 1976. Project 7734. NTIS.** The absence of suitable external criteria is a recurrent problem for test, battery, and inventory developers in selecting items or tests for inclusion in final operational instruments. This report presents a computing algorithm developed for use when no adequate external selection criterion is available. The algorithm uses a multiple linear regression technique and an accretion variable selection process to start with a large pool of variables and select a minimum subset which can account for the domain of reliable variance measured by all variables in the pool. Two example applications are presented: (a) selection of a subset of tests from a battery of 56 tests and (b) selection of a subset of job attitude items from a pool of 348 items. (16 pp.)

7 **Vitola, B.M., Guinn, N., & Magness, P.J. Comparison of enlisted Air Force accessions 1972 – 1974. AFHRL-TR-76-7, AD-A025 850. Lackland AFB, TX: Personnel Research Division, May 1976. Project AFSD1000. NTIS.** Analyses of the 1972 through 1974 accessions lead to the following conclusions: (a) compared to the 1972 accessions, there has been an increase in average aptitudes of the 1973 and 1974 accessions in the Electronics aptitude area along with a moderate decrease in Administrative aptitudes, (b) in the post-draft period, Air Force enlisted a greater percentage of young men and women with 12 or more years of education than were enlisted in 1972, (c) for the male population, there was a significant decrease in the percentage of enlistees with education beyond high school, (d) for females, no change in level of education beyond high school from 1972 to 1974 was noted, (e) the aptitude levels of Black enlistees in 1973–1974 are equal to or higher than the aptitudes of Blacks enlisting in 1972, (f) there has been a deviation from the 1972 pattern of aptitude levels by geographic area to the extent that Areas 3 and 4 (South and Southwest) do not consistently fall at the lowest end of the geographic aptitude spectrum, (g) Air Force continues to enlist a proportion of Blacks equal to, or greater than, the proportion of Blacks found in the general population, and (h) the all-volunteer Air Force has not created a "man-drain" of skills from the civilian manpower pool. Enlistment is from the mid-range portion of the aptitude spectrum with a return, four years hence to the civilian sector of thousands of skilled personnel in over 200 job types. (22 pp.)

8 **Taylor, J.N. Short tour rotation indices for identifying airmen overseas skill imbalance. AFHRL-TR-76-8, AD-A028 481. Lackland AFB, TX: Occupational and Manpower Research Division, May 1976. Project 2077. NTIS.** This report describes a methodology developed for identifying and predicting imbalanced Air Force specialties. A specialty is imbalanced if its airmen are not allowed at least a 24-month interval between involuntary short tours, or are required to serve more than two involuntary short tours during a 20-year career. The method produces an index for each specialty indicating its balance/imbalance status. Also, a procedure is included which reduces the number of imbalanced specialties by simulating the movement of surplus airmen from balanced to imbalanced specialties. (24 pp.)

9 **Guinn, N., Vitola, B.M., & Leisey, S.A. Background and interest measures as predictors of success in undergraduate pilot training. AFHRL-TR-76-9, AD-A025 851. Lackland AFB, TX: Personnel Research Division, May 1976. Project 7719. NTIS.** A sample of 593 pilot trainees in Officer Training School were administered the Strong Vocational Interest Blank and the Officer Biographical and Attitudinal Survey. Their performance in pilot training was monitored in order to assess the effectiveness of biographical, attitudinal, and interest data in predicting pilot training criteria. Using item analysis, four eliminee keys were developed from the survey data; regression analysis was utilized to select various models of predictors to be used as possible Pilot Selection Composites (PSC). Using the optimal cutoff score for PSC Model 1, 38 percent of the eliminees were correctly identified and only 10 percent of the graduate group incorrectly labeled as potential failures. For Model 2, 18 percent of the eliminee category was identified as high-risk for attrition along with seven percent of the successful graduates. With Model 3, 45 percent of the eliminees were labeled as potential failures along with 20 percent of the graduate group. The possibility of increasing the accuracy of prediction by using non-cognitive data and the operational usefulness of the composites are discussed. (20 pp.)

10 **DeMaio, J., Parkinson, S., Leshowitz, B., Crosby, J., & Thorpe, J.A. Visual scanning: Comparisons between student and instructor pilots. AFHRL-TR-76-10, AD-A023 634. Williams AFB, AZ: Flying Training Division, June 1976. Project 2313, Contract F41609-75-C-0018, Arizona State University. NTIS.** The performance of instructor pilots and student pilots was compared in two visual scanning tasks. In the first task both groups were shown slides of T-37 instrument displays. Some slides contained a significant deviation from a pre-determined straight and level course, and the task was to detect the error as quickly as possible. Instructor pilots detected errors faster and with greater accuracy than student pilots, thus providing evidence for the validity of the procedures employed. However, contrary to the concept of a fixed cross-check, student pilots showed a greater tendency to employ a systematic search pattern than did instructor pilots. This result suggests that rather than using a rigid scanning pattern, instructor pilots, by virtue of their additional flight experience, use a flexible scanning strategy which allows them to emphasize important or difficult aspects of the display. In the second experiment the attention diagnostic method task was employed to determine if the experience in visual scanning obtained in the flight situation would transfer to a novel scanning task. In the first session there were no differences in response latency between instructor pilots, student pilots, and a group of university students. Instructor pilots, however, showed a significant linear decrease in latency over the course of eight sessions while this trend was absent in the other two groups. This suggests that instructor pilots learn to attend to critical features more efficiently than do individuals with little or no flight experience. The results of the present experiments recommend the use of a variety of scanning tasks in the UPT program to facilitate the more rapid development of adaptive scanning strategies. (34 pp.)

11 **Eubanks, J.L. Differential incentive effects under varying instruction conditions. AFHRL-TR-76-11, AD-A028 477. Williams AFB, AZ: Flying Training Division, July 1976. Project 2313, Contract F41609-75-C-0028, Arizona State University. NTIS.** Three consecutive experiments examined the effect of offering college students performance-contingent points toward their final course grade under various combinations of knowledge of correct response and rules with examples. Students who were offered points and received rules with examples scored lower on an immediate posttest than students who received rules with examples but were not offered the points. The situation was reversed for students who did not receive rules with examples: posttest scores were higher when points were offered. This disordinal interaction between performance-contingent points and rules with examples was significant ($p < .05$) in all three experiments. The main effect of rules with examples was significant ($p < .001$) across all three studies. Neither points nor knowledge of correct response produced significant main effects. (38 pp.)

12 **King, N.W., & Eddowes, E.E. Similarities and differences among superior, marginal, and eliminated undergraduate pilot training students. AFHRL-TR-76-12, AD-A028 484. Williams AFB, AZ: Flying Training Division, May 1976. Project 1123. NTIS.** This report compares interview data from highly successful and marginally successful graduates with similar data from students eliminated from undergraduate pilot training (UPT). The objectives of the study were: to delineate factors which distinguish the successful from the unsuccessful student, to identify problems of UPT which impact generally upon all students alike, and to denote aspects of the UPT program which may warrant modification. Information from interviews with 119 graduates was compared with information from interviews with 114 eliminees. Further, for problems related to flying training, comparisons were made among data from 61 students who graduated in the top quarter of their class, 58 who graduated in the lowest quarter of their class, and 28 students eliminated for flying deficiency. Successful students differed from eliminees in amount of previous flying experience, less problems learning to land aircraft, less loss of confidence, and fewer changes of IPs, had less criticism from their IPs, listed more problem aspects of the UPT program and had more realistic expectations about the demands of UPT. Problems seen generally by all students related to: problems with poor instructor pilot (IP) teaching characteristics, difficulties learning the overhead landing pattern, formation, instruments, grades, and IP-student relationships. Recommendations suggest studies of IP training and modifications of techniques for teaching some of the flying skills. (26 pp.)

13 **Hendrix, W.H. Selection and classification using a forecast applicant pool. AFHRL-TR-76-13, AD-A025 327. Lackland AFB, TX: Occupational and Manpower Research Division, June 1976. Project 2077. NTIS.** A time series analysis model was developed to forecast the quality (i.e., means and standard deviations of aptitude scores) and quantity (i.e., total number of applicants) of the Air Force's future applicant pool. By forecasting future talent of applicants and their number, an approximate optimal assignment solution could be obtained even though the applicants have to be assigned one at a time. The model was developed on 258,588 subjects who had taken the Airman Qualifying Examination during 1971 to 1974. The model included trend and seasonal components and was evaluated by applying it to forecast monthly means, standard deviations, and total number of applicants. Results in terms of mean absolute deviation and squared absolute deviation scores indicated that the model could forecast within one point of the actual observed score values across two years for means and standard deviations, but not as well for total number of applicants. (10 pp.)

14 **McFadden, R.W., Edwards, B.J., & Tyler, D.M. Development and evaluation of pretraining as an adjunct to a pilot training study. AFHRL-TR-76-14, AD-A031 801. Williams AFB, AZ: Flying Training Division, June 1976. Project 1123. NTIS.** The utility of the pretraining of task-relevant

cognitive skills within the context of experimental research methodology was investigated in this study. A criterion-referenced pretraining multi-media product was developed and applied to support the initial phase of an experimental research effort in which several instructional methods for training pilots in an aircraft simulator were investigated. The objectives of the pretraining materials phase of the study were: (a) to provide a standardized, replicable method of orientation of subjects across three experimental groups, (b) to permit the training and assessment of prerequisite entry behaviors which were relevant to the tasks taught in the simulator, and (c) to enhance experimental control for the study. Instructional materials were developed and validated following instructional systems development (ISD) procedures. The materials consisted of a modified programmed text, review questions, a video taped briefing/demonstration, and a criterion test. Materials were validated using two sample groups from the target population of undergraduate pilot training (UPT) casual students.

The multi-media pretraining package was applied during the initial or orientation phase of the instructional strategies study. Criterion test scores of the experimental groups receiving pretraining exceeded acceptance criteria for the specified prerequisite skills as called for in the instructional product validation. Achievement scores on the criterion test for the experimental groups closely replicated those of the validation group (non-significant differences in mean scores).

The study demonstrated the value of cognitive pretraining as an adjunct to experimental research methodology in which subjects require training in prerequisite skills prior to formal data collection activities. It also showed that systematically developed, validated instructional materials can facilitate the teaching of prerequisite skills, enhance experimental control, and generally aid in the conduct and administration of a data collection effort.

It was recommended that systematically developed pretraining be further investigated beyond the context of functional orientation and subject preparation. Other possible avenues of investigation include pretraining within the context of the selection of experimental designs for data collection such as pretesting, and investigations of pretraining in which various instructional variables are manipulated. (104 pp.)

15 **Goody, K. Task factor benchmark scales for training priority analysis: Overview and developmental phase for administrative/general aptitude area. AFHRL-TR-76-15, AD-A025 847. Lackland AFB, TX: Occupational and Manpower Research Division, June 1976. Project 7734. NTIS.** Research by the Occupational and Manpower Research Division of the Air Force Human Resources Laboratory has established that task training priority is a function of task factors and that, within a specialty, training priority ratings can be duplicated mathematically from task factor ratings. Because these ratings are measured on a different scale for each specialty, this methodology cannot be generally established and applied. To overcome this limitation, a series of benchmark scales are being developed for the measurement of task factors against common frames of reference. This report, the first in a series, establishes the concept of the scales and describes the method to be used in their development and validation. It then reports on the development phase of the scales for specialties with either an administrative or general aptitude requirement. Subsequent reports will deal with the validation phase of this series of scales, and the development and validation phases of scales for specialties with an electronic aptitude requirement and for those with a mechanical aptitude requirement. (16 pp.)

16 **Jensen, H.E., & Valentine, L.D., Jr. Validation of ASVAB-2 against civilian vocational-technical high school criteria. AFHRL-TR-76-16, AD-A023 118. Lackland AFB, TX: Personnel Research Division, March 1976. Project 7719. NTIS.** This technical report presents the relationship between performance of high school students on the components and composites of the ASVAB-2 and their subsequent performance in civilian vocational-technical courses.

Applicability of current Air Force composites to specific vocational categories is also presented. (34 pp.)

17 **Hendrix, W.H. Contingency approaches to leadership: A review and synthesis. AFHRL-TR-76-17, AD-A028 485. Lackland AFB, TX: Occupational and Manpower Research Division, June 1976. Project 7734. NTIS.** Definitions of leadership are presented to establish a common frame of reference for discussing the area of leadership. Three approaches to leadership are presented, followed by a discussion of leadership related literature, and eight contingency theories or models. The literature discussion and the contingency theories serve as a basis for the development of a new model of leadership (Model 9). Its development is followed by a conclusion which attempts to integrate those aspects found to be common across the various leadership theories. (42 pp.)

18 **Askren, W.B., Campbell, W.B., Seifert, D.J., Hall, T.J., Johnson, R.C., & Sulzen, R.H. Feasibility of a computer simulation method for evaluating human effects on nuclear systems safety. AFHRL-TR-76-18, AD-A025 310. Wright-Patterson AFB, OH: Advanced Systems Division, May 1976. Project 1124. NTIS.** The objective was to determine the feasibility of integrating human resources data and maintenance task data with a computer simulation technique in order to develop a computer based tool for performing safety analyses of nuclear systems. Thirteen human resource factors relevant to maintenance operations of nuclear systems were identified. A job sequence network and maintenance task data were developed for the Short Range Attack Missile (SRAM) system. A three category taxonomic scheme was devised to describe the SRAM maintenance tasks.

Five human resource factors were selected for further analysis. Quantitative relationships were developed between each of the factors (work motivation, work experience, psychological fatigue, written job instructions, and ambient temperature) and the two maintenance task performance factors of time and hazard for the three job categories using subjective estimation techniques. This resulted in 30 regression equations. The 30 equations, the SRAM maintenance network, and the SRAM task performance data were integrated with the SAINT (System Analysis of Integrated Networks of Tasks) computer simulation technique to provide a deterministic/stochastic model for predicting maintenance task time and hazard values from varying input human resource conditions. The results, in general, show the feasibility of a computer analytic method for evaluating human effects on nuclear systems safety. (154 pp.)

19 **Scott, D.L., & Joyce, R.P. TEKTRONIX 545B oscilloscope training. AFHRL-TR-76-19, AD-A022 941. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel. This document is one of the 12 general test equipment programs and concerns the TEKTRONIX 545B Oscilloscope. This oscilloscope has wide usage in both military and civilian electronics maintenance. The program requires the use of a small signal generator which is described in AFHRL Technical Report 74-57(II), Part I (AD-A004 845). The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the many functions of this oscilloscope.

The other 11 general test equipments for which similar programs are available include TS-1100/U Transistor Tester, TS-148 Radar Test Set, TV-2A/U Tube Tester, URM-25D Signal Generator, 200 CD Wide Range Oscillator, 5245 L Electronic Frequency Counter, Fluke 803 Differential Voltmeter, HP 410B VTVM, Kay Model 860 Sweep Generator, SG-299 B/U Signal Generator, and Simpson 260 Voltohmmeter (VOM). (155 pp.)

20 **Scott, D.L., & Joyce, R.P. TS-1100/U transistor tester training. AFHRL-TR-76-20, AD-A022 930. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the TS-1100/U Transistor Tester. This, or similar test equipment, has wide usage in both military and civilian electronics maintenance. The program requires the use of four test transistors. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment. It can be used for specific training on the TS-1100/U. In addition it provides a model for self-paced programs for teaching the use of similar test equipments.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-148 Radar Test Set, TV-2A/U Tube Tester, URM-25D Signal Generator, 200 CD Wide Range Oscillator, 5245 L Electronic Frequency Counter, Fluke 803 Differential Voltmeter, HP 410B VTVM, Kay Model 860 Sweep Generator, SG-299 B/U Signal Generator, and Simpson 260 Voltohmmeter (VOM). (17 pp.)

21 **Scott, D.L., & Joyce, R.P. TS-148 radar test set training. AFHRL-TR-76-21, AD-A022 931. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the TS-148 Radar Test Set. This, or similar test equipment, has wide usage in both military and civilian electronics maintenance. The program requires the use of the test bench for the AN/APN-147 Doppler Radar. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment. This training program applies specifically to the use of TS-148 with the AN/APN-147. In addition, it provides a model for self-paced programs for other applications of the TS-148 and for programs for teaching the use of similar test equipments.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-1100/U Transistor Tester, TV-2A/U Tube Tester, URM-25D Signal Generator, 200 CD Wide Range Oscillator, 5245 L Electronic Frequency Counter, Fluke 803 Differential Voltmeter, HP 410B VTVM, Kay Model 860 Sweep Generator, SG-299 B/U Signal Generator, and Simpson 260 Voltohmmeter (VOM). (16 pp.)

22 **Scott, D.L., & Joyce, R.P. TV-2A/U tube tester training. AFHRL-TR-76-22, AD-A022 932. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed

instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the TV-2A/U Tube Tester. This, or similar test equipment, has wide usage in both military and civilian electronics maintenance. The program requires the use of five electron tubes. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-1100/U Transistor Tester, TS-148 Radar Test Set, URM-25D Signal Generator, 200 CD Wide Range Oscillator, 5245 L Electronic Frequency Counter, Fluke 803 Differential Voltmeter, HP 410B VTVM, Kay Model 860 Sweep Generator, SG-299 B/U Signal Generator, and Simpson 260 Voltohmmeter (VOM). (28 pp.)

23 **Scott, D.L., & Joyce, R.P. URM-25D signal generator training. AFHRL-TR-76-23, AD-A022 933. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the URM-25D Signal Generator. This, or similar test equipment, has wide usage in both military and civilian electronics maintenance. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment. This training program applies specifically to the URM-25D. It, also, provides a model for self-paced programs for teaching the use of similar test equipments.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-1100/U Transistor Tester, TS-148 Radar Test Set, TV-2A/U Tube Tester, 200 CD Wide Range Oscillator, 5245 L Electronic Frequency Counter, Fluke 803 Differential Voltmeter, HP 410B VTVM, Kay Model 860 Sweep Generator, SG-299 B/U Signal Generator, and Simpson 260 Voltohmmeter (VOM). (13 pp.)

24 **Scott, D.L., & Joyce, R.P. 200 CD wide range oscillator training. AFHRL-TR-76-24, AD-A022 934. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the 200 CD Wide Range Oscillator. This, or similar test equipment, has wide usage in both military and civilian

electronics maintenance. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-1100/U Transistor Tester, TS-148 Radar Test Set, TV-2A/U Tube Tester, URM-25D Signal Generator, 5245 L Electronic Frequency Counter, Fluke 803 Differential Voltmeter, HP 410B VTVM, Kay Model 860 Sweep Generator, SG-299 B/U Signal Generator, and Simpson 260 Voltohmmeter (VOM). (10 pp.)

25 **Scott, D.L., & Joyce, R.P. 5245L electronic counter training. AFHRL-TR-76-25, AD-A022 939. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the 5245L Electronic Frequency Counter. This, or similar test equipment, has wide usage in both military and civilian electronics maintenance. As indicated on the first page, the program requires the use of several items of equipment associated with the maintenance of the AN/APN-147 Doppler Radar. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment. This training program applies specifically to the use of the 5245L with the AN/APN-147. In addition, it provides a model for self-paced programs for other applications of the 5245L and for programs for teaching the use of similar test equipments.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-1100/U Transistor Tester, TS-148 Radar Test Set, TV-2A/U Tube Tester, URM-25D Signal Generator, 200 CD Wide Range Oscillator, Fluke 803 Differential Voltmeter, HP 410B VTVM, Kay Model 860 Sweep Generator, SG-299 B/U Signal Generator, and Simpson 260 Voltohmmeter (VOM). (54 pp.)

26 **Scott, D.L., & Joyce, R.P. Fluke 803 differential voltmeter training. AFHRL-TR-76-26, AD-A022 956. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the Fluke 803 Differential Voltmeter. This, or similar test equipment, has wide usage in both military and civilian electronics maintenance. The program requires the use of a Voltage/Resistance Console which is described in AFHRL Technical Report 74-57(II), Part I (AD-A004 845). The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-1100/U Transistor Tester, TS-148 Radar Test Set, TV-2A/U Tube Tester, URM-25D Signal Generator, 200 CD Wide Range Oscillator, 5245L Electronic

Frequency Counter, HP 410B VTVM, Kay Model 860 Sweep Generator, SG-299 B/U Signal Generator, and Simpson 260 Voltohmmeter (VOM). (23 pp.)

27 **Scott, D.L., & Joyce, R.P. HP-410B VTVM training. AFHRL-TR-76-27, AD-A022 940. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the HP-410B Vacuum Tube Voltmeter (VTVM). This, or similar test equipment, has wide usage in both military and civilian electronics maintenance. The program requires the use of a Voltage/Resistance Console which is described in AFHRL Technical Report 74-57(II), Part I (AD-A004 845). The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this VTVM.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-1100/U Transistor Tester, TS-148 Radar Test Set, TV-2A/U Tube Tester, URM-25D Signal Generator, 200 CD Wide Range Oscillator, 5245L Electronic Frequency Counter, Fluke 803 Differential Voltmeter, Kay Model 860 Sweep Generator, SG-299 B/U Signal Generator, and Simpson 260 Voltohmmeter (VOM). (53 pp.)

28 **Scott, D.L., & Joyce, R.P. Kay model 860 sweep generator training. AFHRL-TR-76-28, AD-A022 957. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the Kay Model 860 Sweep Generator. This, or similar test equipment, has wide usage in both military and civilian electronics maintenance. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-1100/U Transistor Tester, TS-148 Radar Test Set, TV-2A/U Tube Tester, URM-25D Signal Generator, 200 CD Wide Range Oscillator, 5245L Electronic Frequency Counter, Fluke 803 Differential Voltmeter, HP 410B VTVM, SG-299 B/U Signal Generator, and Simpson 260 Voltohmmeter (VOM). (18 pp.)

29 **Scott, D.L., & Joyce, R.P. SG-299 B/U signal generator training. AFHRL-TR-76-29, AD-A022 972. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such

potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the SG-299 B/U Signal Generator. This, or similar test equipment, has wide usage in both military and civilian electronics maintenance. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-1100/U Transistor Tester, TS-148 Radar Test Set, TV-2A/U Tube Tester, URM-25D Signal Generator, 200 CD Wide Range Oscillator, 5245L Electronic Frequency Counter, Fluke 803 Differential Voltmeter, HP 410B VTVM, Kay Model 860 Sweep Generator, and Simpson 260 Voltohmmeter (VOM). (9 pp.)

30 **Scott, D.L., & Joyce, R.P. Simpson 260 VOM training. AFHRL-TR-76-30, AD-A022 984. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the 12 general test equipment programs and concerns the Simpson 260 Voltohmmeter (VOM). This, or similar test equipment, has wide usage in both military and civilian electronics maintenance. The program requires the use of a Voltage/Resistance Console which is described in AFHRL Technical Report 74-57(II), Part I (AD-A004 845). The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this VOM.

The other 11 general test equipments for which similar programs are available include TEKTRONIX 545B Oscilloscope, TS-1100/U Transistor Tester, TS-148 Radar Test Set, TV-2A/U Tube Tester, URM-25D Signal Generator, 200 CD Wide Range Oscillator, 5245L Electronic Frequency Counter, Fluke 803 Differential Voltmeter, HP 410B VTVM, Kay Model 860 Sweep Generator, and SG-299 B/U Signal Generator. (56 pp.)

31 **Scott, D.L., & Joyce, R.P. Doppler generator CMA-546 training. AFHRL-TR-76-31, AD-A022 946. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the six special test equipment programs. It concerns the CMA-546 Doppler Generator, used in maintaining the AN/APN-147 Doppler Radar. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other five special test equipments for which similar programs are available include Doppler Simulator CMA-544/T(H), Navigational Computer Tester, Computer Drives Tester, Computer Relay Chassis Tester, and Computer Cards Tester. (8 pp.)

32 **Scott, D.L., & Joyce, R.P. Doppler simulator CMA-544/T (H) training. AFHRL-TR-76-32, AD-A022 942. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the six special test equipment programs. It concerns the CMA-544/T (H) Doppler Simulator, used in maintaining the AN/APN-147 Doppler Radar. This program requires the use of the Radar Bench Test Setup. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other five special test equipments for which similar programs are available include Doppler Generator CMA-546, Navigational Computer Tester, Computer Drives Tester, Computer Relay Chassis Tester, and Computer Cards Tester. (11 pp.)

33 **Scott, D.L., & Joyce, R.P. Navigational computer tester training. AFHRL-TR-76-33, AD-A022 945. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the six special test equipment programs. It concerns the Navigational Computer Tester, used in maintaining the AN/ASN-35 Computer. This program requires the use of the AN/ASN-35 Computer test bench setup as well as several components of the AN/ASN-35. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other five special test equipments for which similar programs are available include Doppler Generator CMA-546, Doppler Simulator CMA-544/T(H), Computer Drives Tester, Computer Relay Chassis Tester, and Computer Cards Tester. (20 pp.)

34 **Scott, D.L., & Joyce, R.P. Computer drives tester training. AFHRL-TR-76-34, AD-A022 971. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the six special test equipment programs. It concerns the Computer Drives Tester, used in maintaining the AN/ASN-35 Computer. This program requires the use of the AN/ASN-35 Computer test bench setup as well as several components of the AN/ASN-35. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other five special test equipments for which similar programs are available include Doppler Generator CMA-546, Doppler Simulator CMA-544/T(H), Navigational Computer Tester, Computer Relay Chassis Tester, and Computer Cards Tester. (21 pp.)

35 **Scott, D.L., & Joyce, R.P. Computer relay chassis tester training. AFHRL-TR-76-35, AD-A022 944. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the six special test equipment programs. It concerns the Computer Relay Chassis Tester, used in maintaining the AN/ASN-35 Computer. This program requires the use of the AN/ASN-35 Computer test bench setup as well as several components of the AN/ASN-35. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other five special test equipments for which similar programs are available include Doppler Generator CMA-546, Doppler Simulator CMA-544/T(H), Navigational Computer Tester, Computer Drives Tester, and Computer Cards Tester. (18 pp.)

36 **Scott, D.L., & Joyce, R.P. Computer cards tester training. AFHRL-TR-76-36, AD-A022 943. Wright-Patterson AFB, OH: Advanced Systems Division, September 1975. Project 1194, Contract F33615-74-C-5154, Applied Science Associates, Inc. NTIS.** Eighteen self-paced programmed instruction packages concerning the use of twelve general, and six special, electronic test equipments have been developed. Although these programs were developed specifically in conjunction with the evaluation of Fully Proceduralized Job Performance Aids (JPA) under the advanced development project 1194, they have potential for much wider and long term use. Such potential includes use in formal training courses, field training courses, initial on-the-job training, and programs for upgrading and maintaining the test equipment proficiency of field personnel.

This document is one of the six special test equipment programs. It concerns the Computer Cards Tester, used in maintaining the AN/ASN-35 Computer. This program requires the use of the several other test equipments and sample cards. The program guides the user through a series of "hands on" exercises that requires him to practice the use of each of the functions of this test equipment.

The other five special test equipments for which similar programs are available include Doppler Generator CMA-546, Doppler Simulator CMA-544/T(H), Navigational Computer Tester, Computer Drives Tester, and Computer Relay Chassis Tester. (16 pp.)

37 **Spangenberg, R.W. Overview of mediated courseware in learning centers. AFHRL-TR-76-37, AD-A033 304. Lowry AFB, CO: Technical Training Division, June 1976. Project 1121. NTIS.** This report provides a companion document to AFHRL-TR-75-69 and includes supplemental information on media related factors, as suggested by field review of the original handbook. An overview of media related factors is provided for the learning center manager who does not have extensive experience with media and desires to explore this aspect of a learning center program more deeply. Discussion includes factors related to mediated courseware selection (such as motion or color requirements in training) and basic information concerning media commonly associated with learning center programs. (52 pp.)

38 **Alley, W.E., & Berberich, G.L. Assessment of AFROTC detachment effectiveness. AFHRL-TR-76-38, AD-A029 200. Lackland AFB, TX: Personnel Research Division, July 1976. Project 7719. NTIS.** Efficient management of large organizations requires that systematic evaluative information be made available on a continuing basis to assess the productivity of organizational subunits and to insure the viable operation of the system as a whole. It is equally important that adequate procedures exist for capitalizing on this information to the fullest possible extent in attempts to improve the effectiveness of the organization. This report summarizes a large-scale research effort directed at providing detachment evaluation data to the Air Force ROTC program.

Multiple criterion measures were used in the analysis. These included traditional enrollment, production and unit cost data, as well as several longer-range indices of productivity based on graduate performance after entry to active duty (i.e., training elimination rates, on-the-job performance and retention). Criteria were developed by detachment for each year's input from 1964 to 1974 (N = 65,000 individual case records).

Multiple regression techniques were used to investigate sources of potential influence on the criteria: institutional characteristics of the host-college and program variations unique to the detachments. Applications of results in the assessment of both current detachments and potential host sites are discussed. Implications for policy change are summarized. (30 pp.)

39 **Bunker, W.M., & Heartz, R.A. Perspective display simulation of terrain. AFHRL-TR-76-39, AD-A030 405. Wright-Patterson AFB, OH: Advanced Systems Division, June 1976. Project 1958, Contract F33615-75-C-5243, General Electric Company. NTIS.** The ever-expanding utilization of electro-optical viewing systems (EVS) requires display simulation which validly depicts the contour or relief characteristics of terrain, rather than merely man-made objects on a flat surface. Such simulation will also be of great value in visual scene simulation. The data preparation techniques and computational algorithms of existing visual scene simulation systems using computer image generation (CIG) have been developed and optimized for man-made objects – hangars, houses, aircraft, carriers, etc. Earlier EVS simulation effort has used these techniques and algorithms. They are not optimum for terrain display.

The effort covered in this report included preparation of simulation data bases from the digitized data prepared by the Defense Mapping Agency. Scenes were generated using several techniques for data compression. The General Electric CIG algorithm was modified to eliminate the constraint that faces be formed into convex objects – a highly artificial constraint for terrain faces. Scenes were generated using both visual and EVS processing.

A radar display simulation system was modified to produce perspective displays, and scenes were generated from the DMA derived data bases.

A comparative analysis of the radar approach versus the CIG approach was prepared, with a detailed definition of the constraints associated with the radar approach.

Some of the simulated scenes were correlated with scenes from a movie made during a flight over the test area.

Finally, an analysis concluded that scenes such as those generated can be produced in real-time by currently available CIG hardware. (180 pp.)

40 **Monroe, E.G., Rife, R.W., Cyrus, M.L., & Thompson, L.C. ASUPT visual simulation of air-to-surface weapons delivery. AFHRL-TR-76-40, AD-A034 319. Williams AFB, AZ: Flying Training Division, June 1976. Project 6114. NTIS.** The original configuration of the Advanced Simulator for Undergraduate Pilot Training (ASUPT) system was designed to support research in undergraduate pilot training. This report describes the addition of an air-to-surface weapons delivery capability to the system.

Provision is made for the delivery of a simulated M-117 bomb and strafe by a 30mm cannon. Information as to the accuracy of the ordnance delivery is presented to the pilot and observer in a number of ways. Immediate feedback is provided by the visual display of the ordnance ground impact points. If a three-dimensional feature is hit, it disappears from the display scene. Special graphics displays provide scoring for selected targets, aircraft parameters at time of release, and real-time monitoring of the aircraft's maneuvers.

A special environmental data base was designed and developed which includes an airfield, gunnery range, and two tactical complexes. Special features include surface-to-air missile, moving ground target, lead/FAC aircraft, anti-aircraft artillery, flak, etc.

Significant algorithm and software program development was required to produce the visual ground impacts and provide trajectories/paths for the ordnance, surface-to-air missile, and moving ground target. To accommodate the additional software, 8K of core memory and a moving head disk drive was purchased and installed. Other hardware modifications included the acquisition of an optical gunsight and the activation of the stick triggers. (66 pp.)

41 **Ree, M.J. Development of statistically parallel tests by analysis of unique item variance. AFHRL-TR-76-41, AD-A025 848. Lackland AFB, TX: Personnel Research Division, May 1976. Project 7719. NTIS.** A method for developing statistically parallel tests based on the analysis of unique item variance was developed. Unique item variance is determined by the multiple correlation of any item with a set of items in an iterative approach.

The approach was successfully implemented on a perceptual ability test and replicated on an attitude scale. (12 pp.)

42 **Jensen, H.E., & Valentine, L.D., Jr. Development of the enlistment screening test–EST Forms 5 and 6. AFHRL-TR-76-42, AD-A033 303. Lackland AFB, TX: Personnel Research Division, May 1976. Project 7719. NTIS.** This technical report deals with the development of an enlistment screening test which identifies those Air Force applicants most likely to meet ASVAB qualifying standards. (12 pp.)

43 **Valentine, L.D., Jr., & Massey, I.H. Comparison of ASVAB test-retest results of male and female enlistees. AFHRL-TR-76-43, AD-A029 517. Lackland AFB, TX: Personnel Research Division, June 1976. Project 7719. NTIS.** Male and female enlistees were compared on the basis of their performance on the Armed Services Vocational Aptitude Battery. Mean Aptitude Index scores were compared for male and female enlistees on the original testing and on retest. Males scored higher on mechanical and electronics, and females scored higher on administrative and general. Both males and females tended to do poorer on retest than they had on the original test. The USAF Enlistment Attitude Survey administered shed no light on possible cause for lower scores on retest. Comparisons of test-retest correlations with expectations based on known test reliability suggests that non-standard testing conditions may prevail in operational testing. (24 pp.)

44 **Klein, G.A., & Weitzenfeld, J. General description of human problem solving. AFHRL-TR-76-44, AD-A028 476. Wright-Patterson AFB, OH: Advanced Systems Division, June 1976. Project 1710. NTIS.** Current theories of problem solving have no explanatory account of the processes of problem identification. Gestalt approaches to problem solving did not have this limitation; a problem was seen as undergoing continual reidentification throughout the problem solving process. An analysis of problem solving is presented which extends the Gestalt work. Problem solving is defined as two simultaneous processes: the generation and evaluation of alternatives that will accomplish what is needed, and the reidentification of what is needed on the basis of the experience of generating and evaluating the alternatives. This approach integrates inferential activities, long-term memory, and the management of a limited capacity operational memory into a general account of problem solving. (18 pp.)

45 **Magness, P.J. Annotated bibliography of the Personnel Research Division reports (1973 – 1975). AFHRL-TR-76-45, AD-A029 884. Lackland AFB, TX: Personnel Research Division, May 1976. Project 7719. NTIS.** This bibliography presents an unclassified, unlimited, annotated bibliography of technical reports and other publications on research conducted by the Personnel Research Division, Air Force Human Resources Laboratory (AFHRL). The cited references cover the period calendar year 1973 through calendar year 1975. This report supplements Personnel Research Division Abstracts 1954–1971 and Abstracts of Technical Reports, 1972.

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When reports are ordered from either DDC or NTIS, use the accession number which appears at the end of the bibliographic reference. Some recent reports are included which had not been assigned accession numbers prior to publication of this bibliography. To obtain copies of reports without DDC accession numbers, you must furnish the names of authors, titles, report numbers, and dates to DDC or NTIS. (28 pp.)

46 **Gould, R.B. Longitudinal inferences of job attitude and tenure relationships from cross-sectional data. AFHRL-TR-76-46, AD-A028 482. Lackland AFB, TX: Occupational and Manpower Research Division, July 1976. Project 7734. NTIS.** One objective of an Air Force job satisfaction research program is the identification of career ladders with the greatest potential for improving retention. This study revealed that a regression model (which takes into account airmen career status and months of service while holding constant aptitude differences) can be used to display and interpret cross-sectional attitude data in a longitudinal fashion. The cross-sectional profiles provide a means of identifying specialties with the greatest potential for job reengineering where the goal is to positively influence career decisions through providing more satisfying jobs. (28 pp.)

47 **Thorpe, J.A., Martin, E.L., Edwards, B.J., & Eddowes, E.E. Situational emergency training: F-15 emergency procedures training program. AFHRL-TR-76-47(I), AD-A028 483. Williams AFB, AZ: Flying Training Division, June 1976. Project 1123. NTIS.** The objective of this ongoing research is to evaluate the current emergency procedures training program used for the F-15 and compare it to Boldface emergency procedures training programs. As a result of this comparison, possible improvements in the current F-15 program will be evaluated.

Phase I of this research is the documentation of the current F-15 program. This program is a non-Boldface program. The traditional emergency procedures, common to other USAF weapons systems featuring Boldface procedures which must be committed to memory, do not exist for the F-15. Only three rules, applicable in all emergency/abnormal situations, are specified for F-15 operations: maintain aircraft control, analyze the situation and take the proper action, and land as soon as practicable.

The objective of the present research effort is to develop and evaluate an optimum emergency procedures training program for the F-15. Phase I, presented in this technical report, is the documentation of the current non-Boldface program. This documentation provides the basis for a comparison of the F-15 training program with Boldface training programs. The strengths and weaknesses of both approaches are noted. Five conclusions are derived from this comparative analysis: (a) the traditional Boldface approach has several deficiencies which may reduce the probability that judgment will be exercised when needed. The rapid execution of Boldface procedures demanded in training is probably effective for many emergencies where the Boldface solution applies, but since there are times when Boldface does not apply, Boldface training could inhibit good judgment; (b) the current F-15 emergency procedures training program, named Situational Emergency Training (SET), is more comprehensive than Boldface, encourages the development of judgment, and centers training around the three emergency rules listed above; (c)

the underlying concept of SET is situational training, an approach which systematically manipulates the important dimensions of the emergency situation. The pilot is taught to discriminate the relevant from the irrelevant dimensions of the situation, a discrimination process which is fundamental to exercising judgment; (d) pilots report a positive attitude towards SET training sessions, which in turn has resulted in what supervisors feel is a more productive training program; and (e) by using a scenario development procedure, it is hypothesized that SET can be more effective. An evaluation of such a procedure will be conducted during subsequent phases of this research. Also to be evaluated will be the use of video recording of training sessions to improve instructor technique.

Phase II of this research will evaluate concepts and improvements suggested as a result of the Phase I analysis. (22 pp.)

47A **AFHRL-TR-76-47(II) (Cancelled).**

48 **Koplyay, J.B., Albert, W.G., & Black, D.E. Development of a senior NCO promotion system. AFHRL-TR-76-48, AD-A030 607. Lackland AFB, TX: Computational Sciences Division, July 1976. Project 6323. NTIS.** This report contains the results of a policy capturing study which convened two experimental promotion boards to develop the weighting systems for a proposed senior noncommissioned officer (NCO) promotion system. The proposed promotion system combines the board score derived from the current E-8/E-9 selection board method with the score on a proposed weighted factors composite to arrive at a senior NCO's total promotion score. The development of two weighting systems is presented. First, the weights for the promotion factors comprising the weighted factors component of the proposed system are developed on the basis of a consensus policy from the first experimental board which placed moderate emphasis on all the promotion factors. Next, the weighting scheme for combining the weighted factors and board score components into a total promotion score is identified from a censensus policy of the second experimental board which placed substantial weight on the board score component. The report includes a description of the experimental promotion boards, the senior NCO sample, the promotion system factors and components, and the experimental procedures. Also included are descriptions of the analyses performed, along with a discussion of the results and recommendations for the senior NCO promotion system weights. (36 pp.)

49 **Wilbourn, J.M. Demographic and attitudinal characteristics of United States Air Force Reserve enlistees. AFHRL-TR-76-49, AD-A033 769. Lackland AFB, TX: Personnel Research Division, July 1976. Project 7719. NTIS.** This research report describes the demographic and attitudinal characteristics of 614 male basic Reserve enlistees surveyed during FY 1975. This sample is compared with a previously surveyed sample in FY 1970. Some changes in the personal characteristics between the FY 70 and FY 75 samples are noted. Additionally, their attitudes toward military service and Reserve duty are more positive than FY 70 enlistees. A decrease in educational level and operational test scores was found in the FY 75 sample. When questioned as to incentives that might increase Reserve enlistment, guaranteed job, BX privileges, and increased salary were considered important. Educational support, guaranteed job location, guaranteed promotions, and enlistment bonuses were perceived as effective in consideration of Regular Air Force service. A more positive attitude toward reenlistment was expressed by the FY 75 sample. Perceived negative aspects that might deter reenlistment in the USAFR were irregular working hours, poor physical working conditions, and interference of Reserve duty with educational goals. In the area of advertising, billboards, magazines, and television seem most effective in motivating young men to contact a recruiter. (22 pp.)

50 **Barlow, E.M., & Christensen, M.S. Annotated bibliography of the Air Force Human Resources Laboratory technical reports – 1968 through 1975. AFHRL-TR-76-50, AD-A033 772. Brooks AFB, TX: Headquarters Air Force Human Resources Laboratory, October 1976. (Covers all AFHRL projects.) NTIS.** This annotated bibliography presents a listing of technical reports (1968 through 1975) dealing with personnel and training research conducted by the Air Force Human Resources Laboratory (AFHRL).

The research has been conducted by professional personnel representing a variety of disciplines, including psychologists, operations research specialists, mathematicians, computer analysts, economists, electronic engineers, aeronautical engineers, and technical support personnel.

AFHRL is charged with the planning and execution of USAF exploratory and advanced development programs for selection, motivation, training, retention, education, assignment, utilization, and career development of military personnel; also the composition of the personnel force and training equipment. This Laboratory also provides technical and management assistance to support studies, analyses, development planning activities, acquisition, test evaluation, modification, and operation of aerospace systems and related equipment. (224 pp.)

51 **Sticht, T.G., & Beck, L.J. Experimental literacy assessment battery (LAB). AFHRL-TR-76-51, AD-A030 400. Lowry AFB, CO: Technical Training Division, August 1976. Project 2313, Contract F41609-75-C-0014, Human Resources Research Organization (HumRRO). NTIS.** This report describes the development of a Literacy Assessment Battery (LAB) for determining the relative efficiency with which adults can comprehend language by reading or listening (called *auding* in the LAB). Development of the LAB included: the tryout with adults of two auding and reading tests designed for children; experimental studies of a decoding task involving simultaneous auding and reading; a calibration study to develop auding and reading passages of comparable difficulty; and a small-scale study to demonstrate how the experimental LAB might be normed and interpreted to make it an operational instrument. (170 pp.)

52 **McFarland, B.P. Comparative analysis of nurse and medical service personnel. AFHRL-TR-76-52, AD-A039 484. Lackland AFB, TX: Occupation and Manpower Research Division, December 1976. Project 7734. NTIS.** The purpose of this study was to compare the tasks performed by nurse and medical service corpsman. This is one of a series of reports investigating the role of nurse and medical service corpsman in the Air Force's health care delivery system. A sample of 1,593 nurses and 1,522 medical service corpsmen completed job inventories reporting the tasks they perform and biographical and job attitude information. A cluster analysis was completed of the entire sample and specific job types identified. These job types are discussed in detail and compared with respect to their composition of nurse and medical service corpsman. The results of the job type analysis clearly indicated that there was a significant degree of similarity between the jobs performed by nurse and medical service corpsman. Additionally, job difficulty and job attitude variables were analyzed with respect to each job type. This analysis identified the most significant problem for nurse and medical service corpsman as the management of hospital wards. Recommendations as to the solution of this problem are made. (56 pp.)

53 **Biediger, R.A. Comparisons between abbreviated and controlled officer effectiveness reports. AFHRL-TR-76-53, AD-A037 147. Lackland AFB, TX: Computational Sciences Division, August 1976. Project 6323. NTIS.** The ten performance factor ratings and the average rating in Section III of the new officer effectiveness report Form 707 were compared between controlled and abbreviated reports for 907 colonels rated during the first cycle of the system. Mean differences on ratings for all cases, by command, by two-digit duty Air Force specialty code (DAFSC), by aeronautical rating, and by component were analyzed. The objective of the analysis was to identify significantly higher levels of ratings on performance factors in abbreviated reports than for

corresponding ratings in controlled reports, taking into account variance which might be introduced by changes in job or rater. Results indicate there is no significant inflationary trend in the ratings of colonels on abbreviated reports for the total population, the no-job-change subset, or the no-rater-change subset. Other results indicate that, while significant inflationary trends do emerge for specific commands, they are offset by trends in other commands to provide controlled report ratings that are significantly higher than abbreviated report ratings. Data are presented which suggest interactive effects between rater stability, job stability, and command and between rater stability and DAFSC. (26 pp.)

54 **Beusse, W.E., Waller, E.A., & Ratliff, F.R. Perceptions of equal opportunity and race relations among military personnel. AFHRL-TR-76-54, AD-A036 135. Lackland AFB, TX: Personnel Research Division, December 1976. Project 4499. NTIS.** The purpose of this study was to analyze the perceptions of equal opportunity and race relations among military personnel. Specific areas covered included promotions, duty assignments, military justice, training opportunities, social activities, respect by superiors, housing, perceptions of racial unrest, and opinions about race relations training.

When the perceptions of Whites were compared with those of non-Whites, it was found that non-Whites generally perceived less opportunity for minority group members in most of the areas studied. Non-Whites were more likely than Whites to place a favorable evaluation on race relations training and to perceive improvement in race relations.

Enlisted personnel were more likely than officers to perceive less opportunity for minority group members, more racial unrest, less improvement in race relations, and less value in the race relations training. (26 pp.)

55 **Waller, E.A. Summary of research findings on the military general educational development program. AFHRL-TR-76-55, AD-A036 109. Lackland AFB, TX: Personnel Research Division, December 1976. Project 4499. NTIS.** This report summarizes and integrates the findings of research studies dealing with the military General Educational Development (GED) program. The major areas covered include: (1) the field conduct of the GED program, (2) characteristics of GED program participants, (3) a comparison of the utility of the GED certificate with that of the high school diploma both in-service and post-service, and (4) the impact of attaining a GED certificate.

The findings show that GED program participants had lower average aptitude scores than high school diploma holders, but higher ones than non-participant non-graduates. A higher proportion of certificate holders planned service careers in comparison with their peers. They had higher pay grade at separation than non-certificate holders but lower ones than diploma holders.

The GED certificate was regarded less highly than the high school diploma, but was perceived to have considerable value in both in-service and post-service environments. This was particularly true in-service where the certificate was accepted officially as meeting the requirements for a secondary education credential.

The impact of receiving a certificate was reported to be favorable by both certificate holders and non-certificate holders. The major effects of receiving a certificate were seen as increased confidence in personal ability and increased feelings of general well-being. (26 pp.)

56 **Solomon, W.B. Person-job match preliminary forecasting program. AFHRL-TR-76-56, AD-A030 334. Lackland AFB, TX: Occupational and Manpower Research Division, July 1976. Project 2077. NTIS.** A time series analysis program was developed to forecast the quality (i.e., means and standard deviations of aptitude scores) and quantity (i.e., total number of applicants) of the Air Force's future applicant pool. Forecasting future talent of applicants facilitates optimal assignment solution as new recruits enter the applicant pool. The program uses data compiled on subjects who

had taken the Airman Qualifying Examination from July 1971 through June 1974. The program computes trend and seasonal components, applying these components to forecast for each month: (a) means, (b) standard deviations, and (c) total number of applicants. Results are summarized as absolute deviations and squared deviations. (20 pp.)

57 **Foley, J.P., Jr. Some key problems concerning the specification, development and use of task identification and analyses. AFHRL-TR-76-57, AD-A029 199. Wright-Patterson AFB, OH: Advanced Systems Division, July 1976. Project 1710. NTIS.** This paper concerns the problems involved in the development and use of task identification and analyses (TI&A) as a required part of the technologies of task (job) oriented training (TOT) and job performance aids (JPA). Such analyses are also required for optimum TOT/JPA tradeoffs. It stresses the fact that training which has the flavor of TOT and job guides which have the appearance of fully proceduralized JPA (FPJPA) can be produced without TI&A. However, the content of such training and job aids will be uncontrolled and likely incomplete. To be legally enforceable, the requirements of TI&A must be specified in terms of deliverable products. But specification of such products is not enough. "How to do it" handbooks are required for JPA developers, JPA managers and training specialists. In addition, formal supervised practice in the development and use of TI&A is required to ensure proper performance. Once such expertise is developed by such personnel it should not be used on a "one time only" basis. The usability of various formats of TI&A products as well as the special analyses required for troubleshooting (TS) aids are also discussed. The target of both TOT and JPA technologies is to ensure the maintenance man's ability to perform the tasks of his job efficiently. But currently we are not using appropriate personnel measures to ascertain how many hits and misses we make—and to determine what is causing our misses. As a result the personnel, training and tech data establishments have seldom been held accountable for the effectiveness of their contribution to the efficiency of maintenance task performance. (10 pp.)

58 **Foley, J.P., Jr. Hard data sources concerning more cost effective maintenance. AFHRL-TR-76-58, AD-A029 198. Wright-Patterson AFB, OH: Advanced Systems Division, July 1976. Project 1710. NTIS.** This paper provides an integrating structure for introducing the interested reader to a number of maintenance related human factors technologies and topics. The included topics and technologies have potential for substantially reducing life cycle costs of hardware systems. The high costs related to maintenance and maintenance personnel are primary causes of high life cycle costs. The type and length of many maintenance training programs (as well as the current job structure) make substantial contributions to such costs.

For some electronic maintenance specialties, nearly one year of broad formal training is given first-enlistment personnel. And maintenance training generally is long and costly. Even with such lengthy training, the efficiency of maintenance could be greatly improved. Improved job instructions and information as well as increased use of job (task) oriented training have great potential for decreasing maintenance training time and improving the job performance of maintenance tasks. But to realize such potential, the criteria for the personnel system (selection, training, assignment and promotion) for maintenance personnel must be shifted to the demonstrated ability to perform the tasks of their jobs. (The current criteria emphasize the ability to obtain high scores on paper-and-pencil theory and job knowledge tests.)

The achievement criteria based on the demonstrated performance of tasks as well as the effective use of improved job instruction and job oriented training technologies require (1) effective procedures for identifying, describing and analyzing tasks of maintenance jobs, (2) measurement procedures which ascertain when maintenance personnel are able to perform identified tasks, and (3) modified job structures that result in jobs that contain homogeneous mixes of tasks. Good job oriented training requires training devices that will provide adequate "hands on" practice of job tasks.

The topics introduced in the paper include job performance criteria; the identification of maintenance tasks; the measurement of ability to perform identified maintenance tasks; ways of

obtaining the efficient performance of such tasks, such as job performance aids and task oriented training; the requirement for the restructure of maintenance jobs; as well as the need for integrating human factors maintenance technologies. The paper is designed to reduce the reader's search time for pertinent documents and knowledgeable individuals for each of these subjects. When a good summary is available on a topic which already contains a good list of references, the summary is referenced in lieu of a list of references on that topic. The ideas expressed in this paper are the author's. They do not necessarily reflect the official policies or positions of the Air Force or the Air Force Human Resources Laboratory. (14 pp.)

59 **Czuchry, A.J., Engel, H.E., Dowd, R.A., Baran, H.A., Dieterly, D., & Greene, R. Mid-1980s digital avionics information system conceptual design configuration. AFHRL-TR-76-59, AD-A032 137. Wright-Patterson AFB, OH: Advanced Systems Division, July 1976. Project 2051, Contract F33615-75-C-5218, Dynamics Research Corporation. NTIS.** The research reported herein is part of a larger research effort entitled "Digital Avionics Information System (DAIS) Life Cycle Costing (LCC) Study." The objective of the total effort is to provide USAF with an enhanced in-house capability to incorporate LCC considerations during all stages of the weapon systems acquisition process into the following trade-off areas: avionics design, weapon system operation and maintenance, and planning for manpower utilization and training. The initial application of the results of the study will be to assess the LCC impact of the implementation of the DAIS in the mid-1980s Close Air Support (CAS) weapon system.

The research reported in this technical report was performed to develop two conceptual design configurations. These demonstrate the application of the DAIS concept of avionics integration in the avionics suites of two CAS weapon systems: one of the present day genre, and one of the mid-1980s time frame. They will serve as the data baseline for the remaining tasks of the DAIS LCC Study.

This report presents the two conceptual design configurations representative of a current and a mid-1980s DAIS-configured CAS aircraft avionics suite. They are specified in detail sufficient to support the remaining tasks of the DAIS LCC Study, to include: maintenance task analyses; the development of realistic acquisition, operation, and support costs; and the development of suitable maintenance manpower training techniques and criteria.

The report describes in detail the six major subtasks conducted during the development of the conceptual design configurations: (a) the definition of functional requirements for the CAS mission; (b) the survey of avionics available for inclusion; (c) the generation of a current baseline avionics system; (d) the partitioning of the selected subsystems to effect a current DAIS conceptual design configuration; (e) the projection of technology to the 1980s era; and (f) the generation of a mid-1980s DAIS conceptual design configuration based upon the results of the technology projection. (114 pp.)

60 **Dallman, B.E., & DeLeo, P.J. Effectiveness of smoke abated training in simulated crash fire fighting. AFHRL-TR-76-60, AD-A034 843. Lowry AFB, CO: Technical Training Division, August 1976. Project 1121. NTIS.** Concern for the environment has resulted in the development of a water spray apparatus which can greatly reduce the smoke associated with aircraft crash fire simulations used in fire fighter training. This study compared the effectiveness of smoke abated training with conventional procedures. Results showed no significant differences between students trained under smoke abated conditions and those who experienced natural, or smoky, fires during training. However, students who had received smoke abated training were less confident and more unsure of the effectiveness of their training than conventional students. It was concluded that smoke abated training can be an effective method for training fire protection specialists with certain constraints. Recommendations regarding employment of the smoke suppression apparatus are provided in the report. (40 pp.)

61 **Johnson, C.A., Meehan, J., & Wilkinson, R.E. Officer effectiveness report development – 1971 through 1972. AFHRL-TR-76-61, AD-A039 470. Lackland AFB, TX: Personnel Research Division, September 1976. Project 7719. NTIS.** This report presents the philosophical basis of the officer evaluation system developed during the period 1971 through 1972. The field test of the system proved its administrative feasibility, demonstrated its ability to differentiate between officers, and indicated that it would be acceptable to most raters and ratees. (78 pp.)

62 **Kargo, D.W., & Steffen, D.A. Performance training carrel for electronics principles course. AFHRL-TR-76-62(I), AD-A036 604. Lowry AFB, CO: Technical Training Division, September 1976. Project 1121, Contract F41609-75-C-0031, University of Denver. NTIS.** A prototype performance training carrel was developed to demonstrate a computer managed learning environment. This report describes the simulation panel developed as a part of the carrel. The panel is a plug-in module designed to provide simulation of electronic circuitry and a PSM-6 multimeter as required for a troubleshooting fundamentals lesson in an Air Force Electronics Principles course. (18 pp.)

63 **Wasmundt, K.C., & Steffen, D.A. Software for performance training carrel. AFHRL-TR-76-62(II), AD-A036 194. Lowry AFB, CO: Technical Training Division, September 1976. Project 1121, Contract F41609-75-C0031, University of Denver. NTIS.** A prototype system was developed to evaluate a computer-assisted performance training carrel which was used to present the trouble-shooting fundamentals lesson of the Lowry Technical Training Center's Electronic Principles Course. This manual provides a description of the PDP-11 and PLATO programs used to implement this system, and an operators guide for using the system. The PLATO data input system deletes characters from the data stream whenever more than about three characters per second are transmitted. In order to overcome this problem, the PDP-11 in the carrel is used to control all of the simulation, and transmits only the small amount of data necessary for monitoring the student's performance. The nature of the tables used in the simulation and the philosophy of the communications protocol are explained. (24 pp.)

64 **Pennell, R., Harris, D.A., & Schwille, J. Appraisal of Air Force training course field evaluation system. AFHRL-TR-76-63, AD-A035 641. Lowry AFB, CO: Technical Training Division, October 1976. Project 1121. NTIS.** This study was designed to develop an expanded methodology for analyzing field evaluation data, and to develop a set of recommendations for upgrading the viability of the field evaluation. Data from two field evaluation surveys were analyzed to identify meaningful clusters of tasks performed in the field. Fourteen task clusters were so identified in an inventory management sample, and eight in a materiel facilities sample. These clusters were found to represent actual jobs performed in the field. For each cluster, a number of indices were completed that provide valuable insight into both the evaluation process and the course design process. Major conclusions were (a) more flexibility should be introduced into the data analysis capability for field evaluation, (b) recommendations to course personnel should be meaningful and specific, and (c) recommendations should be made by job cluster rather than by specific task. (32 pp.)

65 **Wiley, L.N. Airman job performance estimated from task performance ratings. AFHRL-TR-76-64, AD-A034 320. Lackland AFB, TX: Occupation and Manpower Research Division, October 1976. Project 7734. NTIS.** An experiment was conducted to determine if a job performance criterion could be developed from averaging airman performance of separate tasks. Airmen who had completed job inventories in the supply field, AFSCs 645X0 and 647X0, from all commands and locations in 1967–1968 were rated by two supervisors in a confidential study. The immediate supervisor and another supervisor were demanded, with complete rating data and an acceptable job inventory. Despite stringent stipulations, 244 airmen, representing all supply levels and locations,

were rated by two supervisors, providing 488 independent sets of ratings. These included an overall rating, ratings on 65 work behavioral traits, performance ratings on all tasks the supervisor was certain the airman performed, and a time-to-train rating on each task in the inventory. The mean task performance rating and the mean task trainability rating were computed. The three criteria of overall performance rating, mean task performance rating, and mean task trainability rating were compared through cross-correlations and cross-regressions, using both the 244 airmen data and the maximum set of 488 observations. The cross-validity of the overall criterion was .58, compared with .56 for the mean task performance rating and .43 for the mean task trainability rating. The regressions showed large contributions from the work behavior ratings, but from the data of record, including grade and job difficulty indices, the contributions were nonsignificant. The mean task performance rating was not cost effective for lower level airmen from the standpoint of rating time consumed. However, the possibility remained open that it might be cost effective for upper level airmen when combined with securing information about the requirements of unusual tasks. (52 pp.)

66 **Tyler, D.M., McFadden, R.W., Eddowes, E.E., & Fuller, R.R. Investigation of diagnostic, error detector and self-taught instructional strategies for flight simulator programs. AFHRL-TR-76-65, AD-A035 682. Williams AFB, AZ: Flying Training Division, October 1976. Project 1123. NTIS.** This study investigated the use of three instructional strategies in the training of basic instrument flight maneuvers in a T-40 simulator under standard conditions and two levels of increased task loading. The three strategies investigated were: (a) diagnostic; (b) error detector; and (c) self-taught. Diagnostic instructors used immediate feedback through error analysis, the error detector instructor used limited feedback, and the self-taught group was instructed without the aid of any feedback from the instructor pilot. The three levels of loading were: (a) no task loading; (b) a change in the center of gravity from normal to full forward; and (c) a change in air turbulence from zero to maximum. Twenty-seven Air Force officers awaiting entry into undergraduate pilot training were randomly assigned to one of the three instructional strategy groups. Each student flew four 50-minute sorties. They were instructed on the following maneuvers: straight and level flight, left turns, right turns, constant airspeed climbs and descents. The fourth sortie was the criterion sortie composed of continuous testing on all five maneuvers, first under normal conditions and then under the two different task load conditions. The results indicate that there were no significant differences between the three instructional strategies; i.e., the students of any one strategy performed equally as well as the students of the other two strategies. The results indicated that there were significant differences among task load conditions. A general decrement in performance was noted when the students flew the maneuvers with the center of gravity change and an even greater decrement when they flew with maximum turbulence. (210 pp.)

67 **Kirby, P.J., & Gardner, E.M. Microcomputer controlled, interactive testing terminal development. AFHRL-TR-76-66, AD-A035 731. Lowry AFB, CO: Technical Training Division, October 1976. Project 1121. NTIS.** The evolution of a self-contained test scoring terminal is presented. The rationale for the design is presented along with an evolutionary description of the requirements for the system. The sequence of software and hardware tools, which were developed in order to build the device, are also described in this report. The resulting device, which contains an imbedded microcomputer is functionally described and the testing strategies which it currently supports are presented. (24 pp.)

68 **Brown, J.S., Burton, R., DeKleer, J., & Benhaim, N. "Intelligent" computer assisted instruction (CAI) applications. AFHRL TR-76-67, AD-A034 844. Lowry AFB, CO: Technical Training Division, October 1976. Project 1121, Contract F41609-75-C-0032, Bolt, Beranek and Newman, Inc. NTIS.** Interim work is documented describing efforts to modify computer techniques used to recognize and process English language requests to an instructional simulator. The conversion from

a hand-coded to a table driven technique are described in detail. Other modifications to a simulation based computer assisted instruction program to allow a gaming situation to be used in the classroom are also documented, and a student protocol taken with this program is presented. Textual support materials used in conjunction with the on-line computer instruction are also presented. (80 pp.)

69 **Brown, J.S., Rubinstein, R., & Burton, R. Reactive learning environment for computer assisted electronics instruction. AFHRL-TR-76-68, AD-A035 302. Lowry AFB, CO: Technical Training Division, October 1976. Project 1121, Contract F41609-75-C-0032, Bolt, Beranek and Newman, Inc. NTIS.** This report describes the development of several new computer based strategies for teaching troubleshooting principles to electronics technicians. The computer programs to implement these strategies were developed in part from software produced in previous contracts. The report documents an experiment in which those materials were presented to student technicians to determine their attitudes toward the techniques, and to determine whether the resulting training resulted in improvement of their technical skills. Results in both cases were positive with students responding very favorably to the materials and with their performance improving quantitatively and qualitatively after the instruction. The computer based techniques used are explained and examples of student interaction with the materials are included in the report. Copies of the tutorial materials used in conjunction with the on-line computer presentations are presented in an appendix. (142 pp.)

70 **Ratliff, F.R., & Earles, J.A. Research on the management training, and utilization of low-aptitude personnel: An annotated bibliography. AFHRL-TR-76-69, AD-A042 605. Lackland AFB, TX: Personnel Research Division, December 1976. Project 4499. NTIS.** This report summarizes the manpower research literature describing the performance, training, and utilization of personnel entering the Armed Forces under reduced physical and mental standards adopted in 1966. Up to 100,000 men were inducted each year under these new standards during the 1966 through 1973 time period. Most of these accessions qualified for military service under the reduced mental standards.

This bibliography is presented in two sections. The first summarizes the research in each of the major areas of investigation, and assesses the contribution to the state-of-the-art and the implications of this resource for management. The second section provides summaries of the manpower research literature dealing with low-aptitude personnel. The summaries are designed to provide general information concerning the problems, methods, and findings of the studies.

The general findings in the studies described are that low-aptitude accessions are trainable and perform successfully in a limited number of career areas. However, they require more time to complete training and have slightly higher attrition rates than higher aptitude accessions. An additional result found in the studies is that military service impacted favorably on post-service adjustment of low-aptitude personnel. They not only achieved a higher education level than non-veterans with similar aptitudes, but they also ended up in higher skilled, higher paying civilian jobs. (94 pp.)

71 **Fletcher, J., & Ree, M.J. Armed Services Vocational Aptitude Battery (ASVAB) correlational analysis, ASVAB Form 2 versus ASVAB Form 5. AFHRL-TR-76-70, AD-A032 593. Lackland AFB, TX: Personnel Research Division, October 1976. Project 7719, Contract F41609-76-C-0006, Rothe Developments, Inc. NTIS.** A total of 2,052 U.S. high school boys and girls, selected from 10 geographical regions, were tested on consecutive half-days using the Armed Services Vocational Aptitude Battery (ASVAB) Form 2 and ASVAB Form 5 vocational aptitude test batteries. Effects of fatigue, training, environmental factors, and proctorial variation were minimized by experimental design. An extensive program of optical scanning, computer analysis, inter-test

comparisons, correlation matrix generation, factor analysis and equipercentile calculations was conducted. Three new tests in the larger battery (ASVAB Form 5) were vocationally oriented as opposed to scholastically oriented. Seven tests common to both batteries had reliability coefficients of 0.56 to 0.76. A new factor in vocational testing, tentatively described as "attention to explicit rules," was identified. (120 pp.)

72 **Engel, H.E., Glasier, J.M., Dowd, R.A., Bristol, M.A., Baran, H.A., & Dieterly, D.L. Digital avionics information system (DAIS): Current maintenance task analysis. AFHRL-TR-76-71, AD-A035 683. Wright-Patterson AFB, OH: Advanced Systems Division, October 1976. Project 2051, Contract F33615-75-C-5218, Dynamics Research Corporation. NTIS.** The equipment used as the basis for performing this maintenance task analysis is a DAIS-configured conceptual design configuration described in *Mid-1980s Digital Avionics Information System Conceptual Design Configuration,* AFHRL-TR-76-59. It is an avionics design configuration suitable for a close air support (CAS) mission that is based on currently available military inventory but reconfigured in accordance with DAIS concept of sensors communicating with a central processor and integrated controls and displays through a multiplex bus. This report describes the methodology used in obtaining reliability and maintainability (R&M) data; its display in a standardized schematic format called a Maintenance Task Network; the partitioning of the historical R&M factors in accordance with the hardware partitioning; and the use of figures of merit, derived from the partitioned R&M data, to rank the subsystems in terms of their impact on mission effectiveness, manpower resources utilization, and operation and maintenance (O&M) costs.

The maintenance task analysis will serve as a baseline for a second maintenance task analysis based on a mid-1980s DAIS design configuration. It will provide inputs for an R&M model which will, in conjunction with standard cost factors, permit the computation of O&M costs. It will provide the equipment-related portion of the data needed for the operation of the DAIS training model which will derive the best methods to train the required maintenance manpower. The numerical values derived from the maintenance task analysis appear as the current maintenance task analysis data bank. This has been accomplished in a format totally compatible with the requirements of the AFHRL Maintenance Manpower Modeling System. (96 pp.)

73 **Wilbourn, J.M., Guinn, N., & Leisey, S.A. Validation of non-verbal measures for selection and classification of enlisted personnel. AFHRL-TR-76-72, AD-A037 589. Lackland AFB, TX: Personnel Research Division, December 1976. Project 7719. NTIS.** A non-verbal aptitude battery was administered to 13,584 non-prior-service male basic airmen. Additional aptitudinal and educational data were combined with the non-verbal tests to assess their usefulness in predicting final technical school grade. Although the correlations between the individual subtests and final school grade (FSG) were not found to be statistically significant in every technical course, figure analogies and dial reading appear to demonstrate the highest relationship with FSG. The multiple correlations based on a composite of all non-verbal subtests reached statistical significance in over 75% of the technical areas in both the total sample and lower ability subgroups, and the composite was found to make a unique and significant contribution to the prediction of FSG over and above the Armed Forces Vocational Aptitude Battery (ASVAB–3) Selector Aptitude Index (AI) alone. When additional aptitudinal and educational data were added to the composite, the predictive efficiency of the composite increased. These findings substantiate the validity of the non-verbal test measures and the potential utility of including these measures in future operational test batteries. (24 pp.)

74 **Buckland, G.H. Brain electrophysiological concomitants of hemispheric laterality while processing altimeter display information. AFHRL-TR-76-73, AD-A034 321. Williams AFB, AZ: Flying Training Division, November 1976. Project 1123. NTIS.** Average evoked potential (AEP)

concomitants of laterality of brain hemispheric function were measured in sixteen subjects while they processed altimeter display information. Three types of schematized altimeter displays were used, representing the counter (CT), counter pointer (CP) and three pointer (3P) altimeters. Two experimental conditions were employed. In Condition I the subject was required to read the altimeter display (2 sec. presentation) as rapidly as possible and generate an integrated verbal response without errors, pausing or stumbling during the response. In Condition II a same/different judgement was required by the subject in response to two brief [400 millisecond (msec)] presentations, which were separated by a two-second inter-stimulus interval, of the same type of altimeter display. The two experimental conditions were selected as standard behavioral paradigms which approximate two modes of altimeter display information processing used by pilots during actual aircraft flight. Condition I was repeated three times during two experimental sessions and Condition II was repeated twice.

The evoked potentials were recorded from left (P_3) and right (P_4) parietal scalp electrodes and averaged across the eighty trials for each altimeter display for each behavioral condition. AEP amplitude measures for the late positive component (LPC) were based on the measurement of a peak, or an average of two peaks, within a restricted range of 300 to 500 msec after the stimulus display onset. The peak amplitude measures were converted to a logarithmic ratio of the right (P_4) amplitude over the left (P_3) amplitude, $Ln(P_4/P_3)$ or its equivalent LnP_4-LnP_3, in order to derive a numerical value representing the right/left asymmetry in AEP amplitude.

During the reading of the three altimeter displays in Condition I there was a significantly larger late positive component LnP_4-LnP_3 value for the CP and 3P displays than for the CT display. This greater right-more-positive effect was interpreted as an evoked potential concomitant of greater right hemisphere functional involvement in the processing of the CP and 3P altimeter information than the CT altimeter information.

The average verbal response latency was more than twice as long for the 3P (1596 msec) than for the CT (641 msec) or CP (604 msec) displays, with the CP having a significantly shorter reaction time (RT) than the CT display. Most subjects also reported that the CP was easier to read than the CT altimeter. The superiority of the CP over the CT altimeter was interpreted as an information processing facilitation possibly due to greater involvement of the right hemisphere in processing the CP display.

Neither the LPC LnP_4-LnP_3 values or the behavioral RT's were significantly different between the altimeter displays for Stimulus 1 or Stimulus 2 in Condition II. However, the LPC LnP_4-LnP_3 values were significantly different between Stimulus 1 and 2 for the 3P altimeter in Condition II. This was interpreted as a possible indication that Stimulus 1 is initially processed more by spatial mnemonic functions in the right hemisphere than Stimulus 2 is for the 3P display. And, that possibly Stimulus 2 is processed more by comparator functions in the left hemisphere than Stimulus 1 is for the 3P altimeter. (106 pp.)

75 **Potter, N.R., & Thomas, D.L. Evaluation of three types of technical data for troubleshooting: Results and project summary. AFHRL-TR-76-74(I), AD-A035 303. Wright-Patterson AFB, OH: Advanced Systems Division, September 1976. Project 1194, Contract F33615-75-C-5103, Systems Research Laboratories, Inc. NTIS.** This report describes a project to evaluate the effectiveness of three types of technical data for troubleshooting, fully proceduralized troubleshooting aids (FPTAs), logic tree troubleshooting aids (LTTAs), and technical orders (TOs). In the project, FPTAs and LTTAs were developed for two moderately complex electronic systems, the AN/APN-147 and AN/ASN-35. The effectiveness of the technical data and the existing TOs for the systems were then evaluated by determining which provided the best support for technicians troubleshooting the systems. This was accomplished by inserting faults into the equipment and having a technician troubleshoot the system using one of the three types of data. Job performance tests were used to measure the performance of the technicians. Technicians with three levels of

experience participated in the study. They were: apprentice technicians with no field experience, experienced technicians with less than six months experience on the systems, and experienced technicians with more than six months experience on the systems. The results indicate that: (1) apprentice technicians are able to troubleshoot more effectively when using FPTAs than when using LTTAs; (2) apprentice technicians troubleshoot more effectively when using FPTAs or LTTAs than when using TOs, (3) apprentice technicians using FPTAs are able to troubleshoot as effectively as experienced technicians using TOs, and (4) fewer parts are replaced unnecessarily when FPTAs or LTTAs are used than when TOs are used. (124 pp.)

76 **Potter, N.R., Hubbert, P.R., Landolfi, J.V., Rice, D.L., & Kearns, N.H. Evaluation of three types of technical data for troubleshooting: Methodology for field evaluation. AFHRL-TR-76-74(II), AD-A035 304. Wright-Patterson AFB, OH: Advanced Systems Division, September 1976. Project 1194, Contract F33615-75-C-5103, Systems Research Laboratories, Inc. NTIS.** This report provides a detailed description of the experimental methods used in a study to evaluate the effectiveness of three types of technical data for troubleshooting, fully proceduralized troubleshooting aids (FPTAs), logic tree troubleshooting aids (LTTAs), and technical orders (TOs). The purpose of the study was to evaluate the effectiveness of these technical data by determining which provided the best support for technicians troubleshooting two moderately complex electronic systems, the AN/APN-147 and AN/ASN-35. (70 pp.)

77 **Potter, N.R., Hubbert, P.R., Landolfi, J.V., Rice, D.L., & Kearns, N.H. Evaluation of three types of technical data for troubleshooting: Test administrator's guide. AFHRL-TR-76-74(III), AD-A031 851. Wright-Patterson AFB, OH: Advanced Systems Division, September 1976. Project 1194, Contract F33615-75-C-5103, Systems Research Laboratories, Inc. NTIS.** This volume contains a guide for the administration of job performance tests used in a study to evaluate the effectiveness of three types of technical data for troubleshooting. The performance tests measure the ability of technicians to troubleshoot 15 typical malfunctions in the AN/APN-147 doppler radar and AN/ASN-35 navigational computer. The tests are specifically designed to measure performance using the three types of data – fully proceduralized troubleshooting aids, logic tree troubleshooting aids and conventional technical orders. Three forms are provided for each test, one for each type of technical data. Guidance is provided for the pretest setup, test administration, and performance evaluation. The complete evaluation project is described in AFHRL-TR-76-74(I). (199 pp.)

78 **Gould, R.B. Review of an Air Force job satisfaction research project: Status report through September 1976. AFHRL-TR-76-75, AD-A035 684. Lackland AFB, TX: Occupation and Manpower Research Division, December 1976. Project 7734. NTIS.** This report presents the status of a long-term comprehensive job satisfaction research project in its fifth year. Ultimate goal of the project is full utilization of personnel, retention of qualified personnel, and maintenance of critical skills. Research findings are presented for each of the interim goals of the research project: (a) to define and measure the dimensions of job satisfaction operating in the Air Force work environment; (b) to identify problem areas which have the greatest potential for improvement through satisfaction research; and (c) to implement job reengineering actions and measure their effects on job attitudes, job performance, and eventual reenlistment decisions. (34 pp.)

79 **Ree, M.J. Effects of item-option weighting on the reliability and validity of the AFOQT for pilot selection. AFHRL-TR-76-76, AD-A035 732. Lackland AFB, TX: Personnel Research Division, December 1976. Project 7719. NTIS.** This study was designed to investigate the effects of the use of differential item-option weights on the reliability and validity of the Air Force Officer Qualifying Test (AFOQT) as used for pilot selection. Two groups of subjects were selected from a pool of 3,400 students who had been admitted to undergraduate pilot training from 1969 to 1972.

Using an extension of the method attributed to Guttman, item-option weights were generated and used to score the AFOQT on a cross-validation group. Corrected-for-guessing scores were computed for comparative purposes. The internal consistency reliability of the subtests and of the pilot composite increased when item-option weights were applied.

The validity of most subtests and the Pilot Composite was higher for item-option weighted scores than for corrected-for-guessing scores.

The reliability of the item-option weights was moderate. (12 pp.)

80 **Siegel, A.I., Williams, A.R., Lapinsky, W.J., Warms, T.A., Wolf, J.J., Groff, S.D., & Burkett, J.R. Studies and design specifications for computerized measurement of textual comprehensibility. AFHRL-TR-76-77, AD-A041 285. Lowry AFB, CO: Technical Training Division, October 1976. Project 1121, Contract F41609-75-C-0037, Applied Psychological Services, Inc. NTIS.** A previous report (Siegel & Burkett, 1974) defined a series of 14 novel measures for determining the comprehensibility of English text on the basis of current psycholinguistic and Structure-of-Intellect oriented concepts. That report not only suggested the potential usefulness of the measures, but also conjectured the feasibility of automating the calculation of these measures. The current report builds upon the prior work and takes the next logical steps in implementing these measures for computer application. First, these measures are analytically defined and described. Then, selected measures are subjected to "laboratory" experimental investigation using Air Force Manuals, Career Development Course materials, and USAF Technical Orders as sample texts. The results of these experiments are presented. An automatic calculation method is then developed for each of the 13 selected measures. The structure of the programming specifications is modular and is intended to calculate the measures for variable size blocks of texts. Flow charts and summary descriptions of the program attributes are also presented, together with explanations of run request syntax, sample measures calculations, and output formats. This report then constitutes a complete definition of the program suitable for future implementation on an automatic data processing system. (254 pp.)

81 **Kettner, N. Armed Services Vocational Aptitude Battery (ASVAB Form 5): Comparison with GATB and DAT tests. AFHRL-TR-76-78, AD-A035 305. Lackland AFB, TX: Personnel Research Division, October 1976. Project 7719, Contract F41609-75-C-0042, Contemporary Research, Inc. NTIS.** The purpose of this study was to compare test performance of high school students on the Armed Services Vocational Aptitude Battery (ASVAB) with the General Aptitude Test Battery (GATB) and the Differential Aptitude Tests (DAT). The design of the study provided for information on test intercorrelations, prediction equations for the ASVAB tests from the commercial tests and conversion tables between highly similar tests across batteries. Separate comparisons were made by grade and sex. A total of 1,232 students were tested and each student took the ASVAB and one other battery. Six of the tests in the ASVAB correlated highly with tests in the commercial batteries. The remainder of tests in the ASVAB were information type tests that had low to moderate correlations with the tests in the commercial batteries. The correlations for the males were generally higher than for the females and the correlations increased with grade. The multiple correlation coefficient in the prediction of the ASVAB tests from the commercial tests ranged from zero to .90. (104 pp.)

82 **Adkins, E.R. Armed Services Vocational Aptitude Battery (ASVAB) Form 5: High school norming and standardization. AFHRL-TR-76-79, AD-A034 323. Lackland AFB, TX: Personnel Research Division, October 1976. Project 7719, Contract F41609-75-C-0044, JWK International, Inc. NTIS.** Form 5 of the Armed Services Vocational Aptitude Battery (ASVAB) was administered to over 35,000 male and female students in grades nine through twelve. The sample was selected to be representative of the students in the national high school population. Normative percentile tables were developed for each subtest and composite for each grade and sex. (50 pp.)

83 **Wilbourn, J.M., Vitola, B.M., & Leisey, S.A. Trends in training performance: 1972 – 1974. AFHRL-TR-76-80, AD-A034 842. Lackland AFB, TX: Personnel Research Division, December 1976. Project 7719. NTIS.** This research reports the aptitudinal and background characteristics of non-prior-service enlistees who graduated or eliminated from basic military and technical training from 1972 through 1974. Comparative analyses were made by racial subgroup, sex, educational level, region of enlistment, aptitude scores, and type of assignment. It was found that the number of Blacks enlisting exceeded their proportion in the population as a whole. Elimination rates have generally decreased in basic military training (BMT) over the years, but have steadily increased in technical training (TT), especially for the total female population and Black males. In some instances eliminees had higher aptitude mean scores than graduates. It was found that college graduates have higher elimination rates than non-college graduates in BMT. In TT, the higher the number of years of education, the lower the attrition rates. Considering age as an attrition factor, the 17-year-old and 23 and 24+ year-old enlistees generally exhibited higher attrition rates than their 18- and 19-year-old counterparts. Females experienced lower attrition rates in BMT than males but higher rates in TT. When compared to the other female age groups, 17-year-olds had higher attrition rates in both BMT and TT. It appears considerable amounts of money may be saved if a mandatory 18-year-old enlistment standard be required. Overall, attrition is not related to region of enlistment except in Areas 3 (South) and 4 (Southwest) where a considerable high attrition rate is evidenced. (28 pp.)

83A **AFHRL-TR-76-81 (pending).**

84 **Goody, K. Comprehensive occupational data analysis programs (CODAP): Use of REXALL to identify divergent raters. AFHRL-TR-76-82, AD-A034 327. Lackland AFB, TX: Occupation and Manpower Research Division, October 1976. Project 7734. NTIS.** REXALL is a very powerful and flexible program within the CODAP (Comprehensive Occupational Data Analysis Programs) system. It was designed primarily for analyzing judges' task-factor ratings, and may be used for identifying divergent raters. Divergent raters are those whose ratings are significantly different from the other raters' ratings. They may be the non-cooperative raters who simply generate an arbitrary pattern of responses rather than try to follow the instructions, or they may invert the rating scale or they may actually perceive the tasks differently. Some divergent raters must be eliminated from the study to preserve the validity of the task means computed from the ratings. This report uses data from an actual study to show how REXALL is used to detect divergent raters, and to decide whether or not to delete them from the study. It then uses the raw data from the study to verify the validity of the decisions made on the basis of the REXALL output. (20 pp.)

85 **Gant, C.R. Economics of on-the-job training: Annotated bibliography and literature review. AFHRL-TR-76-83. Lowry AFB, CO: Technical Training Division, December 1977. Project 1121. NTIS.** The objective of this study was to present a thorough review of the literature on the economics of on-the-job training (OJT). The information contained herein is to be used in developing a cost analytic model for Air Force OJT, under a follow-on contractor work unit. The most relevant literature is reviewed in depth, and background research areas are examined. An extensive annotated bibliography, plus numerous additional references, are included.

86 **Woodruff, R.R., Smith, J.F., Fuller, J.H., & Weyer, D.C. Full mission simulation in undergraduate pilot training: An exploratory study. AFHRL-TR-76-84, AD-A039 267. Williams AFB, AZ: Flying Training Division, December 1976. Project 1123. NTIS.** Eight undergraduate pilot training students were trained to specified levels of performance in all major areas of basic pilot training using the Advanced Simulator for Undergraduate Pilot Training (ASUPT); half were trained using

the platform motion system and half without. Subsequently, they completed basic pilot training (to Air Training Command (ATC) phase standards) in T-37 aircraft. Training hours required and check ride scores were compiled for each subject. Similar data were collected for a control group of eight subjects trained using the conventional ATC syllabus. Using data obtained from both groups, estimates of transfer of training percentages, and training effectiveness ratios were computed.

Simulator trained students required fewer aircraft hours in all areas of basic UPT and achieved check ride scores equal to or better than the control group. No significant or practical differences were documented between performances of the motion and no-motion trained groups for any category of maneuvers.

This was a first effort to incorporate a full mission simulator into an operational pilot training program. Several problem areas were identified which must be solved before full success can be achieved. These same problems should be relevant to application of other full mission simulators in other training programs. In addition, some ASUPT deficiencies were identified. (18 pp.)

87 **Sauer, D.W., Campbell, W.B., Potter, N.R., & Askren, W.B. Human resource factors and performance relationships in nuclear missile handling tasks. AFHRL-TR-76-85, AD-A042 604. Wright-Patterson AFB, OH: Advanced Systems Division, May 1977. Project 1124, Contract F33615-76-C-0042, Systems Research Laboratories, Inc. NTIS.** The objective was to determine quantitative relationships between human resource variables and technician performance on maintenance tasks for nuclear missile systems. Human resource variables relevant to maintenance operations were identified. Instruments for measuring the human resource variables were developed. Task performance measures were developed. An eleven-category taxonomy was developed for coding the maintenance tasks. Data on task performance, human resource variables, and technician opinions were collected from Air Force records or from technicians working at five Air Force bases. Statistical analyses of the data were performed. The results indicate that task performance capability is significantly related to a number of human resource variables such as: satisfaction with the Air Force in general, satisfaction with assignment locality, interest during high school in extracurricular activities, amount of trait fatigue; months in career field, willingness to assume responsibility, level of motivation, and level of work team morale. Mathematical equations were developed which use human resource data to predict task performance proficiency. Results also indicate that technicians across three career fields, five Air Force bases, and three missile systems have the opinion that the following factors have the most influence on task performance: team cohesiveness, emotional stability, fatigue, equipment reliability, weather conditions, and equipment operability. Task performance reliability values were calculated for ten of the eleven maintenance task categories. Those values ranged from .9688 for service tasks to 1.0000 for test tasks. (102 pp.)

88 **Headquarters Air Force Human Resources Laboratory. Fiscal year 1978—Air Force technical objective document. AFHRL-TR-76-86, AD-A035 306. Brooks AFB, TX: Headquarters Air Force Human Resources Laboratory, December 1976. (Covers all AFHRL projects.) NTIS.** This document provides the academic and industrial R&D community with a summary of the technical area objectives of Air Force research in the field of human resources. The areas covered are: (a) Personnel Systems Technology and Utilization; (b) Education and Training Technology; (c) Performance Evaluation; and (d) Human Resources Data in Systems Design and Operation. (16 pp.)

89 **Jensen, H.E., Massey, I.H., & Valentine, L.D., Jr. Armed Services Vocational Aptitude Battery Development (ASVAB Forms 5, 6, and 7). AFHRL-TR-76-87, AD-A037 522. Lackland AFB, TX: Personnel Research Division, December 1976. Project 7719. NTIS.** Toward the objective of satisfying enlistment production requirements of all the services, ASVAB Forms 5, 6, and 7 were

redesigned to incorporate the content of current service classification batteries. The reconfigured battery contains 12 subscales plus the Army's Classification Inventory.

Normative procedures included the administration of ASVAB 5, 6, and 7 at a nationally representative sample of Armed Forces Entrance and Examination Stations (AFEES). Each examinee took one form of the ASVAB along with the AFQT composite from the Army Classification Battery or ASVAB-3. A stratified random sample of 1,600 cases was used in the development of service norms. (22 pp.)

90 **Alley, W.E., Berberich, G.L., & Wilbourn, J.M. Development of factor-referenced subscales for the Vocational Interest-Career Examination. AFHRL-TR-76-88, AD-A046 064. Brooks AFB, TX: Personnel Research Division, June 1977. Project 7719. NTIS.** This report describes the development of factor-referenced subscales for the Vocational Interest-Career Examination (VOICE). The 400-item inventory was administered to random samples of Air Force male (N = 10,035) and female (N = 12,710) recruits. Eighteen integer-weighted subscales were constructed based on a factor analysis of item responses. Psychometric and normative data on the scales are presented for both male and female subgroups. Concurrent validation studies were performed with the Navy Vocational Interest Inventory and the Army Classification Inventory. (26 pp.)

91 **Alley, W.E., Wilbourn, J.M., & Berberich, G.L. Relationships between performance on the Vocational Interest-Career Examination and reported job satisfaction. AFHRL-TR-76-89, AD-A040 754. Lackland AFB, TX: Personnel Research Division, December 1976. Project 7719. NTIS.** This report describes the validation of an Air Force vocational interest inventory in the enlisted force. The Vocational Interest-Career Examination (VOICE) was administered to 18,000 recruits during basic military training. After approximately one year on the job, they were resurveyed to determine the extent to which they were satisfied with their respective occupational assignments. Individual aptitude variables from the Armed Services Vocational Aptitude Battery (ASVAB) served as control measures. Multiple regression analyses were used to characterize relationships between entry-level interests and eventual job satisfaction and to explore moderating effects due to sex and aptitude scores. Results of analyses indicated that the VOICE subscales provided reliable and significant prediction of job satisfaction for both males and females. Recommendations for operational implementation of the procedure were discussed. (32 pp.)

92 **Weyer, D.C., & Fuller, J.H. Development of a syllabus and student/instructor guide for use with a full mission simulator. AFHRL-TR-76-90, AD-A037 521. Williams AFB, AZ: Flying Training Division, December 1976. Project 1123. NTIS.** This report provides a description of the procedures used in developing a syllabus and a student/instructor guide for use with a full mission simulator, the Advanced Simulator for Pilot Training, in the basic phase of Pilot Training. Problem areas in implementing such a program are discussed as are areas of success. (14 pp.)

93 **Harris, D.A. Classification typology for predicting performance in Air Force technical training. AFHRL-TR-76-91, AD-A039 268. Lowry AFB, CO: Technical Training Division, December 1976. Project 1121. NTIS.** This study showed that technical training students could be classified into potential instructional groups, using linear typal analysis. However, the operational and practical consequences of using linear typal analysis were not demonstrated in this study. Further study was suggested in order to determine the practical significance of grouping individuals into instructional groups, based on linear typal analysis. (12 pp.)

94 **Meister, D. Assessment of a prototype human resources data handbook for systems engineering. AFHRL-TR-76-92, AD-A039 269. Wright-Patterson AFB, OH: Advanced Systems Division, December 1976. Project 1124, Contract F33615-76-C-0045, Manned Systems Sciences, Inc. NTIS.** The purpose of this study was to assess the effectiveness, utility and acceptability of a prototype

human resources (HR) data handbook developed by the Air Force Human Resources Laboratory (AFHRL-TR-75-64, AD-A019 553). Twelve system development problems (representative of those the prototype handbook was designed to solve) were simulated in questionnaire form. Thirty-six engineers used the prototype handbook to solve these problems. They also rated problem difficulty level, their confidence in their solutions, the similarity of the problems presented to those they ordinarily dealt with, the usefulness of the prototype handbook, and the adequacy and accessibility of their own data sources compared to the prototype handbook. Results indicated that system development personnel can use the prototype handbook to significantly improve decision correctness. A substantial percentage of respondents considered the prototype handbook to have moderate or greater utility and potential influence on design. Recommendations for improvement of the prototype handbook were made. The assessment is sufficiently encouraging to warrant continuing the effort to develop HR data handbooks. (104 pp.)

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